U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK CONSERVATION PRACTICE GUIDELINE

TERRACE

(FEET)

CODE 600

REFERENCE

National Handbook of Conservation Practices – Code 600 Terrace

Commonly Associated Practices or Processes

The following conservation practices are commonly used in conjunction with this practice to address natural resource concerns and opportunities in New York. This does not imply that any or all of the listed practices must be included or that others may not be included in a conservation management system (CMS). Consult Section III of the Field Office Technical Guide for assistance in developing CMS.

Note: To determine whether a National or New York Conservation Standard applies to this and any other associated practices, check the following website: www.ny.nrcs.usda.gov. Click on the Technical Resources button, and look in the left-hand column for "eFOTG" on the next screen. Next, click on the "eFOTG" link, and look for the Conservation Standards in Section IV.

Table A: Commonly Associated Processes or Practices

Number	Name	Job/Engineering Sheets
328	Conservation Crop Rotation	
329A	Residue Management, No-till and Strip Till	
329B	Residue Management, Mulch Till	
329C	Residue Management, Ridge Till	
340	Cover and Green Manure Crop	
344	Residue Management, Seasonal	
362	Diversion	NY ENG 22 and 23
NY393s	Filter Strip — Strip	NY Job sheet 17 or equivalent form(s)
412	Grassed Waterway	NY ENG 24 and 25, and/or 24A and 25A
468	Lined Waterway or Outlet	
585	Stripcropping	
590	Nutrient Management	
595	Pest Management	
606	Subsurface Drain	NY ENG 28 and 29
620	Underground Outlet	NY ENG 28 and 29

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633	Waste Utilization	
638	Water and Sediment Control Basin	
EFH-2	Estimating Runoff Process	NY ENG 20 EFH Work sheets 1 & 2

OTHER REFERENCES

Engineering Field Handbook – Chapter 1-Engineering Surveys, Chapter 2-Estimating Runoff and Peak Discharges, Chapter 3-Hydraulics, Chapter 7-Grassed Waterways and Outlets, Chapter 8-Terraces, Chapter 9-Diversions.

New York Plant Materials Technical Reference No. 11, "A Guide to Conservation Plantings on Critical Erosion Areas".

Technical Release 62, Engineering Layout, Notes, Staking, and Calculations.

Current Soil Survey Data.

Revised Universal Soil Loss Equation, Version 2 (RUSLE2).

NYS Consolidated Laws, Environmental Conservation Title 10, Water Pollution Control, Section 17-0803, SPDES Permits; Application.

Article 17 Environmental Conservation Law, 6NYCRR, Part 750, State Pollution Discharge Elimination System (SPDES).

http://www.dec.state.ny.us/website/dow/PhaseII.html

CULTURAL RESOURCES

Cultural resource reviews will be conducted for all ground disturbing practices, components, or other activities, as per the State Level Agreement between NRCS and the New York State Historic Preservation Officer.

PERMITS AND NOTIFICATIONS

All permits, easements, and rights-of-way are the responsibility of the landowner. **Dig Safely NY** (formerly the Underground Facilities Protection Organization, or UFPO) and non-member local utilities will be contacted according to the time required before construction to mark all applicable facilities in the construction area. This is the responsibility of the excavator.

Identification and the location of all other farmstead underground or overhead facilities is the responsibility of the landowner.

NYS Consolidated Laws, Environmental Conservation Title 10, Water Pollution Control, Section 17-0803, SPDES Permits: Application.

Article 17 Environmental Conservation Law, 6NYCRR, Part 750, State Pollution Discharge Elimination System (SPDES).

http://www.dec.state.ny.us/website/dow/PhaseII.html

INVENTORY AND EVALUATION

1. Review the conservation cropping system, slope of the fields and soil type. Determine whether a terrace system or a diversion with strip cropping system is suitable for the farm operation and the changes it could introduce into management.

2. If a terrace system is to be used, employ RUSLE2 to determine the terrace interval. Refer to the Terrace Standard for design criteria.

3. Complete a field review using aerial photographs and topographic maps for reference. Review existing fields to determine if larger cropping units can be made.

4. Locate a suitable outlet or outlets for the terrace system and determine stability, safety and property boundaries. The outlet system may involve open type gravity and/or tile outlet. The downstream area should be reviewed for possible negative effects. Consider the necessity of permission for using the selected outlet. All easements and rights-of-way are the responsibility of the landowner. Under no circumstances should water be diverted out of its natural watershed, even if the "new" watershed is on the same property. If a waterway is to be used as a surface outlet for a terrace system, then it must be constructed and vegetated one year prior to construction of the terrace system. If an existing waterway is to be used as a surface outlet, ensure that the established vegetative cover of the waterway will be adequate to safely discharge the additional flows from the planned terraces.

5. Review the cropping equipment used, row spacing, and number of rows to determine compatibility with terrace interval (Refer to EFH, Chapter 8, Page 8-24). Terrace interval must be adaptable to multi-row operation. The front slope of the terrace must be adaptable to equipment width.

6. Terraces must have workable backslopes on fields with slopes less than eight per cent. Terraces with a grass backslopes should be planned on field with slopes greater than eight per cent. Generally, a field slope of twelve per cent is the maximum limit for planning cropland terraces.

7. Review the soil maps for the area to be terraced and evaluate the typical soils. Conduct soil borings for the typical area and in suspected problem soils. Typical soil and site concerns to consider include shallow to bedrock, sandy soil or steeper sections in depressional areas including those that exist in waterways or gullies.

8. Select the key terrace location in the field, usually near the center of the area to be terraced. The key location should most nearly represent average field conditions. All additional terrace locations are determined from the key terrace. It is permissible to group parallel terraces with correction areas for maintaining alignment.

9. The key terrace should be flagged at 50-foot intervals on the centerline using a predetermined channel grade. Intermediate stations that cross waterways or low areas should be flagged for possible tile outlets or waterway outlets. The centerline of the key terrace must be adjusted to improve alignment for "farmability" by varying the grade, cuts and fills. Layout additional parallel terraces from the key terrace by measuring off the terrace spacing.

10. To control alignment, stake the terrace layout. Establish and survey a system of benchmarks (known as a "bench level circuit") within the terrace area. Survey staked terrace alignments, survey planned underground and/or waterway outlets. Obtain typical cross sections as required for variations in hillside slopes for storage computations for underground outlets. For storage computation with level terraces and tile outlet terraces, complete a cross section survey every 50 feet, or as needed. The survey notes are to be compiled as outlined in EFH, Chapter 1, and TR-62.

11. Complete the field survey notes with comments and sketches on the outlet, field organization, access roads, field boundaries, tile lines, fill and/or borrow areas, utilities, etc.

DESIGN PROCEDURE

1. Delineate and compute the drainage area for each individual terrace and compute peak discharge and the runoff based on a 10-year frequency storm, using Chapter 2 of EFH.
2. A single terrace or system of terraces must have a diversion at the top of the field above the terrace installation. Design the diversion to provide a minimum protection equal to a ten year frequency storm.

For Gradient Terraces:

- Plot the profiles based on survey data. Select elevation for pre-determined channel grade based on the profile. After elevation of channel grade is established, use the terrace cross section to determine terrace capacity, ridge height, and velocities using the computed peak discharge and Manning's Equation. Refer to EFH, Chapter 3, Equation 3-15, Page 3-39. Develop the balance of cut and fill volumes based on the typical cross section for the gradient portion and the procedure as shown in EFH, Chapter 8.
- Design a stable outlet for the volume of discharge from the terrace system.

For Underground Outlet Terraces:

- Plot the profile of the terrace based on survey data. Starting at the surface inlet of the underground outlet, plot a finished channel bottom grade each way from the surface inlet. Select a finished terrace ridge height and compute the volume of storage using the selected channel cross-section (cut slope and front slope), suitable for site conditions, as shown in EFH Chapter 8.
- Determine drainage area to the surface inlet of the underground outlet, and calculate the runoff volume based on the ten year frequency storm event.
- Compare the computed storage volume to runoff volume and adjust the ridge height (up or down) as required until the storage volume equals or is slightly greater than the runoff volume.
- Design the surface inlet and underground outlet conduit based on drainage area to surface inlet, required draw down time for terrace storage, and underground outlet conduit grade for each basin area. Design an orifice at each surface inlet to restrict flow so pressure flow does not develop. Refer to the procedure outlined in Chapter 8, EFH.
- Gradient portions of the underground outlet terraces are designed according to the gradient terrace design procedure, as outlined above.

3. Compile all design information in appropriate design folder.
4. Develop construction drawings and specifications for terrace project, locate and describe all visible public utilities near terrace project.
5. Compute material quantities, such as excavation, earth fill, type and length of pipe (for each of the designed sizes) and for any other appurtenances.
6. Determine the appropriate seeding for the soil type and rate of flow (Q). Select seeding mixture from Plant Materials Technical Reference #11, "A Guide to Conservation Plantings on Critical Areas". Complete the job seeding requirements on NY-ENG-17, Seeding Grasses and Legumes, or equivalent form(s).

7. Develop a cost estimate, an O & M Plan, and an inspection plan for the project, and review these and the completed construction drawings and specifications with the landowner.
8. A statement requiring the excavator to notify **Dig Safely NY** and non-member utilities for proper utility notification is **REQUIRED** on the drawing.
9. Determine your level of Job Approval Authority for the design class of this project, obtain approval from appropriate individual, if not qualified.
10. Assemble a complete final construction package.

CONSTRUCTION LAYOUT AND INSPECTION

1. Provide copies of the construction specifications and drawings to the landowner. Explain all aspects of the job before a contractor is secured. Review the O&M plan with the landowner to assure proper maintenance of the completed practice.
2. Thoroughly review the job with the landowner and contractor prior to construction. Insure that all utilities applicable to the job site have been notified and are marked prior to construction.
3. Schedule the construction start with the landowner and contractor. Coordination of all staking and construction timing with the contractor and landowner can assure an efficient use of manpower. Plan the start of construction such that the completion time will permit optimal establishment of vegetative cover, if required.
4. Mark the channel centerline stations with proposed cuts, set and mark offset grade stakes if needed, set cut slope stakes or flags to show top of cut.
5. Stake the centerline of the ridge by measuring off front slope distance from centerline of channel. Mark the required cut or fill for finished ridge height. Using the back slope, calculate the distance to the toe and flag the toe of the terrace.

CONSTRUCTION INSPECTION

Make random construction checks during implementation. The checks should include:

- Adherence to the design grade;
- Cut slope, front slope and the back slopes;
- Height of ridge (additional for freeboard or settlement, as indicated in design); and,
- For underground outlet terraces, check surface inlet(s) size, material, and elevation; and orifice location(s) and size(s); and conduit materials, sizes and grades; and other appurtenances, as required.

During the final construction check, assure that the:

- Installed outlet(s) (as applicable) are stable and free of spoil and debris.
- Construction spoil and debris are properly disposed of;
- Completed earthwork is suitable for seeding establishment and planned farming operations, and,
- Final seeding requirements have been installed in accordance with the seeding plan and/or for the planned crop sequence.

Document the progress of the construction in the Cooperator Assistance Notes (NRCS-CPA-6/6A) or a similar job log. In addition, photographs documenting construction progress are useful, although not required.

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FINAL DOCUMENTATION REQUIREMENTS

All properly planned, designed, and installed conservation practices require documentation in the appropriate case file. Documentation must be sufficient to show:

1. The design conforms to the applicable standard;
2. The prepared construction drawings and specifications accurately reflect the design;
3. The installed practice meets the requirements of the construction drawings and specifications; and,
4. The "As Built" condition of the practice. All drawings shall be identified "As Built" as drawn in red, and all changes shall be made in red.

REPORTING

Enter all documentation on the Conservation Plan (NRCS-CPA-68), Conservation Assistance Notes (NRCS-CPA-6/6A) and the contract document (NRCS-LTP-11), if applicable.

Report the practice and applicable components in the NRCS progress reporting system. Be certain to report benefits for all applicable resources and resource concerns as allowed in the NRCS progress reporting system.

OPERATION AND MAINTENANCE

Facilities, structure, and practices must be operated and maintained to ensure proper function and longevity. Periodic follow-up with the landowner is essential to ensure that all operation and maintenance (O&M) requirements are understood and followed.

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